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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,073	12/12/2003	Raymond L. Degner	015290-795	8903

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EXAMINER

JOHNSON, JONATHAN J

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/734,073
90/007,027
90/007,114

Applicant(s)

DEGNER ET AL.

Examiner

Jonathan Johnson

Art Unit

1725

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

1/2

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5-4-04; 5-10-04
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: IDS: 12-12-03

U.S. Patent and Trademark Office
PTOL-326 (Rev. 7-05)

Office Action Summary

Part of Paper No./Mail Date 110405

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 16-19, 30, and 31, are rejected under 35 U.S.C. 102(b) as being anticipated by JP 01-204424 (Takao). With respect to claims 1, 3-5, and 16-17, Takao teaches a reactor of the type having a first electrode for supporting a substrate, an opposed electrode, and means for producing a plasma therebetween, wherein the opposed electrode has one face exposed to the first electrode and an opposite face connected to an electrical source and a thermal sink (figure 1, items 7, 5, 13, 14 and page 2), the improvement comprising an opposed electrode including (a) an electrode plate composed of a substantially pure material (amorphous carbon) and having a substantially uniform thickness (figure 1, item 7) and (b) a support frame composed of an electrically and thermally conductive material (aluminum) bonded to a back face of the plate, whereby the support frame is connected to the electrical source and thermal sink and a front face of the plate which is exposed to the first electrode is substantially free from protuberances (page 8, and figure 1, items 4 and 7); wherein the electrode plate comprises a disk (figure 1, item 7); wherein the disk includes a plurality of apertures therethrough to permit the flow of a reactant gas into the space between the electrodes (figure 1, item 7, apertures);

wherein the support frame comprises a ring which is secured about the periphery of the disk (figure 1, item 7, ring); wherein the electrode plate is composed of a pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2); wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel (page 4).

With respect to claims 18, 19, 30, and 31, Takao teaches an electrode composed of a substantially pure material (amorphous carbon) and having a substantially uniform thickness (figure 1, item 7); and a support ring bonded about the periphery of one face of the disk (where the electrode body 4 is bonded around the periphery of electrode 7), leaving the other face substantially flat and free from protuberances, wherein the support ring is composed of an electrically and thermally conductive material (where the electrode body 4 is made of aluminum); wherein the disk includes a plurality of apertures to permit gas flow therethrough (figure 1, item 7, apertures); wherein the electrode plate is composed of a pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2); wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel (page 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 1 above and further in view of US 4,340,462 (Koch). Koch teaches the opposed electrode is mounted in an assembly having an insulating ring which is flush with the entire periphery of the exposed face, whereby the support frame is protected from exposure to the plasma (figure 3, item 20, 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the structure of the electrode in order to provide a sealable chamber (Koch, col. 3, ll. 60-67).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 3 above and further in view EP 346055 (Okazaki). Okazaki teaches the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk (figure 2, item 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki page 4).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 3 above and further in view JP 61-243170 (Shigeru). Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (figure 1, item 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2).

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 5 above. Takao teaches a parallel plate electrode reactor to hold semiconductor wafers (page 2). Because Takao teaches substantially the same machine as applicants to perform plasma etching (page 2 and applicant's abstract), the claimed ranges would have been obvious in order to obtain a high precision etching apparatus (page 2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 1 above and further in view of JP 61-279672

(Yamada). Yamada teaches the plate is bonded to the support frame by means of a bonding layer, which has a low vapor pressure, bonding layer is formed by soldering. (page 3, ll. 4-7) It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada page 3, ll. 1-20).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 13 above and further in view JP 61-243170 (Shigeru). Shigeru teaches wherein at least one of the plate and the support frame is metallized (page 2, ll. 14-20). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the plate and the support frame in order to form a strong bond between the indium and the substrate (see Shigeru page 2).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 10 above and further in view of JP 61-243170 (Shigeru). Shigeru teaches the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding (p. 2, ll. 19-20 and figure 3, item 102). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize the bonding layer is free from voids and uniform electrical and thermal conductivities in order to form a strong bond to the substrate (see Shigeru page 2).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 18 above and further in view EP 346055 (Okazaki). Okazaki teaches the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk (figure 2, item 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki page 4).

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 18 above and further in view JP 61-243170 (Shigeru). Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (figure 1, item 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2).

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 18 above. Takao teaches a parallel plate electrode reactor to hold semiconductor wafers (page 2). Because Takao teaches substantially the same machine as applicants to perform plasma etching (page 2 and applicant's abstract), the claimed ranges would have been obvious in order to obtain a

high precision etching apparatus (page 2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Claims 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above and further in view of JP 61-279672 (Yamada). Yamada teaches the plate is bonded to the support frame by means of a bonding layer, which has a low vapor pressure, bonding layer is formed by soldering. (page 3, ll. 4-7) It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada page 3, ll. 1-20).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 27 above and further in view JP 61-243170 (Shigeru). Shigeru teaches wherein at least one of the disk and the ring is metallized (page 2, ll. 14-20). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the disk and the ring in order to form a strong bond between the indium and the substrate (see Shigeru page 2).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 124 above and further in view of JP 61-243170 (Shigeru). Shigeru teaches the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding (p. 2, ll. 19-20 and figure 3, item 102). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize the bonding layer is free from voids and uniform electrical and thermal conductivities in order to form a strong bond to the substrate (see Shigeru page 2).

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over by JP 01-204424 (Takao) as applied to claim 18 above and further in view JP 61-243170 (Shigeru). Shigeru teaches a backing plate is bonded around the periphery of the silicon oxide plate. The material of the backing plate Cu has a higher CTE than the electrode plate. When cooled, the differential contraction imparts the stress. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the particular structure of the packing plate and electrode plate in order to obtain uniform film formation (see Shigeru page 2).

Claims 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-243170 (Shigeru) in view of JP 61-279672 (Yamada). Shigeru teaches bonding the backing plate to an electrode plate (silicon dioxide) at elevated temperature (170 C, translation page 2), wherein the material of the electrode plate (Cu) has a higher

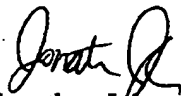
coefficient of thermal expansion than that of the electrode plate (silicon dioxide); and allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress (page 2); Yamada teaches a forming an electrode assembly including a support ring and an electrode plate (figure 3, item 38); wherein the elevated temperature is chosen to be above an expected operating temperature of the electrode assembly (page 2); wherein the electrode plate is formed from a substantially pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the backing plate and electrode plate to utilize forming an electrode assembly having a support ring and electrode plate in order to provide a sputtering apparatus that enables a high purity film formation (see Yamada page 2).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 571-272-1177. The examiner can normally be reached on M-Th 7:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jonathan Johnson
Primary Examiner
Art Unit 1725